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| MATRIC. NUMBER | 19/ENG09/021 |
| DEPARTMENT | AEROSPACE ENGINEERING |
| COURSE CODE | ENG 214 |
| COURSE TITLE | FLUID MECHANICS |
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SOLUTIONS:

1. v1 = 5m/s, head1 = 2.5m

 length = 2m

 v2 = 2m/s, head2 = ?

Loss of head = (0.35(v1-v2)2)/2g

Loss of head = (0.35(5-2)2)/ (2\*9.81) = head1 – head2

head1 – head2 = 2.5 – head2 = 0.16

head2 = 2.5 – 0.16

head2 = 2.34m

1.

 20cm

 10cm

Pinlet = 17.658 N/cm2

Pthroat = 30 cmHg

Cd = 0.98

Discharge = Qactual

Qactual = Cd \* Qtheoretical

Qactual = Cd \*a1a2 (2gh)0.5

 (a12 – a22)0.5

Where h = pressure head difference

Pinlet = 17.658 N/cm2 = 132 cmHg

x = 132.4 cmHg – 30 cmHg

x = 102.4 cmHg

h = x(Sh/So - 1)

h = 102.4(13.6/1 - 1)

h = 1290.24 cm of H2O

a1 = $π$(20)2/4 = 314.159 cm2

a2 = $π$(10)2/4 = 78.540 cm2

a12 = 98695.88 cm4

a22 = 6168.53 cm4

Discharge = Qactual = 0.98 \*314.159\*78.54\* (1962\*1290.24)0.5

 (98695.88 – 6168.53)0.5

= 126478.34 cm3/s

Discharge = 126.5 litres/s

Pipe diameter, Dp = 30 cm

Orifice diameter, Do = 15 cm

Pressure difference = 50cmHg = x

Coefficient of discharge = 0.64

Specific gravity of oil = 0.9

Ap = $π$(30)2/4 = 706.86 cm2

Ao = $π$(15)2/4 = 176.71 cm2

h = x(Sh/So - 1)

h = 50(13.6/0.9 - 1)

h = 705.5 cm of H2O

Qactual = Cd \*a1a2 (2gh)0.5

 (a12 – a22)0.5

Discharge = 0.64 \*706.86\*176.71\* (1962\*705.5)0.5

 (706.862 –176.712)0.5

= 137420.86 cm3/s

Discharge = 137.4 litres/s